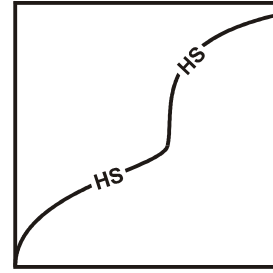
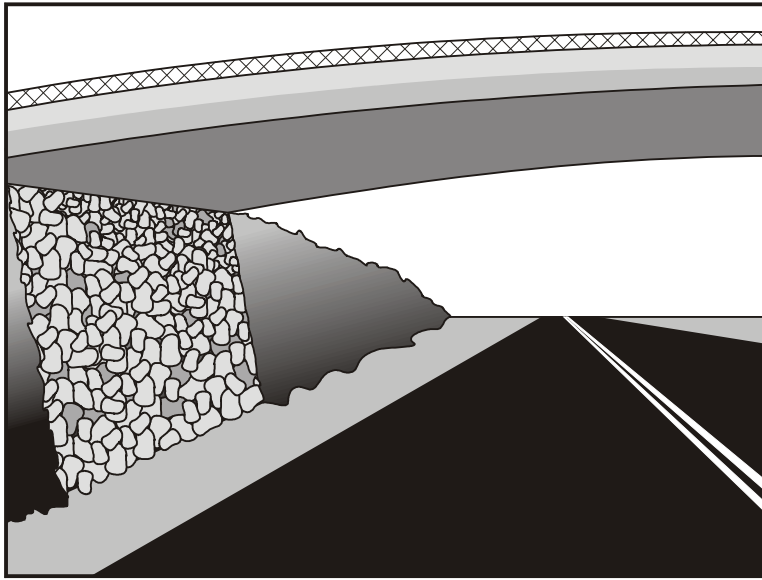


Hard Surfaces



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water

Definition and Purpose Hard surfaces consist of placing concrete, rock, or rock and mortar slope protection.

Appropriate Applications ■ Areas where vegetation would not provide adequate erosion protection.

Limitations ■ Aesthetics
■ Increases runoff peaks and velocities

Design Guidance Design of hard surface slope protection must be coordinated with the District Landscape Architect, Materials, Maintenance and other interested units.

Rock Slope Protection

- Rock slope protection consists of placing revetment type rock courses in layers.
- Loose, sharp, or extraneous material must be removed from the slope prior to placement of rock slope protection.
- Underlayment fabric must be placed loosely over the surface so the fabric conforms to the surface without damage. Equipment or vehicles should not be driven directly on the fabric.
- A footing trench should be excavated along the toe of slope.
- Local surface irregularities should not vary from the planned slope by more than 0.3 m as measured at right angles to the slope.

Rock and Mortar Slope Protection

- As a minimum, the top 1/3 of the rocks must be exposed.
- If the rocks are to be grouted in place with concrete, the rocks should be cleaned of any adhering dirt or clay and then moistened. The concrete should be placed with buckets, chutes, tubes, pneumatic equipment, or other mechanical means and then spaded and rodded into place to ensure adequate penetration. After the concrete has been placed, the rocks should be thoroughly brushed so that their top surfaces are exposed.

Concrete Slope Protection

- Concrete slope protection consists of constructing portland concrete cement or shotcrete slope paving under the ends of bridges and at other locations.
- Foundation areas should be evenly graded and thoroughly compacted, with moisture sufficient to allow a firm foundation and to prevent absorption of water from the concrete or mortar.
- Work should be scheduled so that the work (including placing, finishing, and application of curing compound) between timber borders is started and completed in the same day. There should not be any construction joints between timber spacers.

References

- Section 72-5, Concrete-Rock Slope Protection, p. 520, State of California Department of Transportation Standard Specifications (July 1999)
- Section 72-6, Slope Paving, p. 523, State of California Department of Transportation Standard Specifications (July 1999)
- 1999 Standard Plan D101, p. 145, State of California- Department of Transportation Standard Plans (July 1999).
- California Bank and Shore Rock Slope Protection Design. Caltrans Study No. F90TL03 (June 1996).